GEOMETRIC DIMENSIONING AND TOLERANCING

Course Code	20ME4701B	Year	IV	Semester	I
Course Category	Professional Elective- III	Branch	ME	Course Type	Theory
Credits	3	L – T – P	3 – 0 – 0	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes: Upon successful completion of the course, the student will be able to

	Statement	Skill	Levels	Units
CO 1	Illustrates basic principles of Geometric and Dimensioning Tolerancing, symbols.	Understand	L2	1,2,3,4,5
CO 2	Set up and use basic rectangular datum reference frames	Apply	L3	3
CO 3	Interpret form, Location, profile, and runout tolerances.	Apply	L3	4,5

Contribution of Course Outcomes towards achievement of Program Outcomes
Strength of correlations (3: High, 2: Moderate, 1: Low)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	2		2				2			2	2	1
CO 2	3		2		2				2			2	2	2
CO 3	3	3	2		2				2			2	2	1

Syllabus

UNIT	Contents	Mapped COs
I	**Introduction:** Scope, Definitions, Fundamental Rules, Units of Measure, Types of Dimensioning, Application of Dimensions, Dimensioning Features, Location of Features **Symbology:** Use of Notes to Supplement Symbols, Symbol Construction, Feature Control Frame Symbols, Feature Control Placement, Definition of Tolerance Zone, Tabulated Tolerances	CO1
II	**Principles of Tolerancing:** Direct Tolerancing Methods, Tolerance Expression, Interpretation of Limits, Single Limits, Tolerance Accumulation, Limits of Size, Applicability of Modifiers on Geometric Tolerance Values and Datum Feature References, Screw Methods, Gears and Splines, Boundary Conditions, Angular Surfaces, Conical Tapers, Flat Tapers, Radius, Tangent Plane, Statistical Tolerancing.	CO1
III	**Datum Reference Frames:** Degrees of Freedom, Degrees of Freedom Constrained by Primary Datum Features, Regardless of Material Boundary, Constraining Degrees of Freedom of a Part, Datum Feature Simulator, Theoretical and Physical Application of Datum Feature Simulators, Datum Reference Frame, Datum Features and Controls, Specifying Datum Features in an Order of Precedence, Establishing Datums, Multiple Datum Features, Mathematically Defined Surface, Multiple	CO1, CO2

	Datum reference frames, Functional Datum Features, Rotational Constraint about a Datum Axis or Point, Application of MMB, LMB and RMB to Irregular Features of Size, Datum Feature Selection Practical Applications, Simultaneous Requirements, Restrained Condition, Datum Reference Frame Identification, Customized Datum Reference Frame Construction, Application of a Customized Datum Reference Frame, Datum Targets	
IV	Form Tolerances: Form Control, Specifying Form Tolerances, Application of Free-State Symbol Orientation Tolerances: Orientation Control, Orientation Symbols, Specifying Orientation Tolerances, Tangent Plane, Alternative Practice Location Tolerances: Positional Tolerancing, Positional Tolerancing Fundamentals – I and II, Pattern Location, Coaxial Feature Controls, Tolerancing for Symmetrical Relationships	**CO1, CO3**
V	Profile Tolerances: Profile, Tolerance Zone Boundaries, Profile Applications, Material Condition and Boundary Condition Modifiers as Composite Profile, Multiple Single-Segment Profile Tolerancing, Combined Controls Runout Tolerances: Runout, Runout Tolerance, types of Runout Tolerances, Applications, specification.	**CO1, CO3**

Learning Resources
Text Books
1. Geometric Dimensioning and Tolerancing by P.S. Gill, (Publ.) S. K. Kataria & Sons, 2009 2. Geometric Dimensioning and Tolerancing: Applications and Techniques for Use in Design: Manufacturing, and Inspection, by James D. Meadows, CRC Press, 1995. 3. Simplified GD & T: Based on ASME-Y 14.5-2009 by Ashok Kumar 2nd Edition, Azuko Publishing 2009
Reference Books
1. Integrated Product Design and Manufacturing Using Geometric Dimensioning and Tolerancing: Robert G. Campbell, CRC Press, 2002